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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/881,782	06/18/2001	Takashi Udagawa	Q61741	1610

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EXAMINER

BROCK II, PAUL E

ART UNIT	PAPER NUMBER
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2815

DATE MAILED: 06/18/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/881,782

Applicant(s)

UDAGAWA, TAKASHI

Examiner

Paul E Brock II

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 8-10 and 18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7, 11-17, 19 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☒ The proposed drawing correction filed on 25 October 2002 is: a) ☒ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ 6) ☐ Other: _____

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

For example, JP-A-2000-58451, as taught in the specification on pages 19 – 20, is not listed on any information disclosure statements which have been filed.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 1 – 10, 11 – 18, and 19 – 20 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. With regard to claims 1 – 10 and

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19 – 20, it is not clear where in the originally filed specification support for “said second conduction-type surface ohmic electrode... does not exist below said pad electrode,” can be found. With regard to claims 11 – 18, it is not clear where in the originally filed specification support for “said second conduction-type surface ohmic electrode... does not exist below said pad electrodes,” can be found.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1 – 3 and 6, 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ming-Jiunn et al. (USPAT 6078064, Ming-Jiunn) in view of Ohba et al. (USPAT 5076860, Ohba) and Okazaki et al (USPAT 5977566, Okazaki).

With regard to claim 1, Ming-Jiunn discloses in figure 7 a group-III nitride semiconductor light-emitting diode comprising at least a first conduction-type single crystal substrate (52) provided with a first conduction-type back-surface ohmic electrode (19) on a back surface thereof, a buffer layer (16) on a front surface of the single crystal substrate, a gallium nitride (GaN)-based group-III nitride crystal layer (13/14) having a light-emitting part of hetero-junction structure on the buffer layer, and a window layer (11b) comprising an electrically conducting transparent oxide crystal layer on the group-III nitride crystal layer, wherein at least a

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second conduction-type surface ohmic electrode (42) conductive with the window layer is between the surface of the group-III nitride crystal layer and the window layer and comes into contact with the surface of the group-III nitride crystal layer and a whole pad electrode for wire bonding is on the center of the upper surface of the window layer. Ming-Jiunn does not teach that the buffer layer comprises a boron phosphide (BP)- based material. Ohba teaches in figure 13 a buffer layer (62) comprising a boron phosphide (BP)-based material on a front surface of a single crystal substrate (61). It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the boron phosphide buffer layer of Ohba in the device of Ming-Jiunn in order to form an indirect transition buffer layer as stated by Ohba in column 11, lines 30 – 35. Ming-Jiunn and Ohba do not teach that the second conduction –type surface ohmic electrode is composed of a plurality of electrodes. Okazaki teaches in figures 1 and 4 a second conduction-type surface ohmic electrode (13) conductive with a window layer (15) is between a surface of a group-III nitride crystal layer (7) and the window layer and comes into contact with the surface of the group-III nitride crystal layer, a pad electrode (17) for wire bonding is disposed on the center of the upper surface of the window layer, the second conduction-type surface ohmic electrode is composed of a plurality of electrodes and does not exist below the pad electrode, and the window layer covers the surface of the group III nitride crystal layer below the pad electrode. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the plurality of electrodes of Okazaki in the device of Ming-Jiunn and Ohba in order to effectively scatter current as stated by Okazaki in column 6, lines 6 – 9. With regard to claim 2, Okazaki teaches in figures 1a and 4 wherein the second conduction-type surface ohmic electrodes are disposed in a periphery of the pad electrode.

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With regard to claim 3, Okazaki teaches in figures 1 and 4 wherein the second conduction-type surface ohmic electrodes are disposed at a bilaterally symmetric position with respect to the center of the pad electrode.

With regard to claim 6, Okazaki teaches in figures 1 and 4 wherein the second conduction-type surface ohmic electrodes are is disposed in an open light-emitting region other than a projective region of the pad electrode on the surface of the group-III nitride crystal layer.

With regard to claim 7, Okazaki teaches in figures 1a and 4 wherein the sum of areas of second conduction-type surface ohmic electrodes is from 5 to 30% of a total area of the open light-emitting region.

6. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ming-Jiunn, Ohba and Okazaki as applied to claim 1 above, and further in view of Bastek (USPAT 4232440).

It is not clear if Ming-Jiunn, Ohba and Okazaki teach wherein the second conduction-type surface ohmic electrodes are disposed at isometric positions from the center of the pad electrode. Bastek teaches in figure 3 wherein a second conduction-type surface ohmic electrodes (16) are disposed at isometric positions from the center of a pad electrode (15). It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the positioning of Bastek in the device of Ming-Jiunn, Ohba and Okazaki in order to make contact to a light emitting portion of a light emitting device with a high degree of reliability and with minimum interference with light emission.

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7. Claims 11 – 13, 16, 17, 19, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ming-Jiunn in view of Okazaki.

With regard to claim 11, Ming-Jiunn discloses in figure 7 an electrode for group-III nitride semiconductor light-emitting diodes for a group-III semiconductor light-emitting diode comprising at least a gallium nitride (GaN)-based group-III nitride crystal layer (13/14) having a light-emitting part of hetero-junction structure, and a window layer (11b) comprising an electrically conducting transparent oxide crystal layer provided on the group-III nitride crystal layer, wherein at least a surface ohmic electrode (42) conductive with the window layer is between the surface of the group-III nitride crystal layer and the window layer and comes into contact with the surface of the group-III nitride crystal layer and a whole pad electrode for wire bonding is disposed on the center of the upper surface of the window layer. Ming-Jiunn does not teach that the second conduction -type surface ohmic electrode is composed of a plurality of electrodes. Okazaki teaches in figures 1 and 4 a surface ohmic electrode (13) conductive with a window layer (15) is between a surface of a group-III nitride crystal layer (7) and the window layer and comes into contact with the surface of the group-III nitride crystal layer, a pad electrode (17) for wire bonding is disposed on the center of the upper surface of the window layer, the surface ohmic electrode is composed of a plurality of electrodes, and the window layer covers the surface of the group III nitride crystal layer below the pad electrode. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the plurality of electrodes of Okazaki in the device of Ming-Jiunn in order to effectively scatter current as stated by Okazaki in column 6, lines 6 – 9. As far as the examiner can ascertain Ming-

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Jiunn and Okazaki read on the limitation that the second conduction type surface ohmic electrode does not exist below the pad electrode.

With regard to claim 12, Okazaki teaches in figures 1a and 4 wherein the surface ohmic electrodes are disposed in a periphery of the pad electrode.

With regard to claim 13, Okazaki teaches in figure 7 wherein the surface ohmic electrodes are disposed at a bilaterally symmetric position with respect to the center of the pad electrode.

With regard to claim 16, Okazaki teaches in figure 7 wherein the surface ohmic electrodes are disposed in an open light-emitting region other than a projective region of the pad electrode on the surface of the group-III nitride crystal layer.

With regard to claim 17, Okazaki teaches in figures 1a and 4 wherein the sum of areas of surface ohmic electrodes is from 5 to 30% of a total area of the open light-emitting region.

With regard to claim 19, Ming-Jiunn discloses in figure 7 forming a surface ohmic electrode in contact with a surface of a gallium nitride (GaN)-based group-III nitride crystal layer having a light-emitting part of hetero-junction structure. Ming-Jiunn discloses in figure 7 then covering the surface of the group-III nitride crystal layer and the surface ohmic electrode to form a window layer comprising an electrically conducting transparent oxide crystal layer conductive with the surface ohmic electrode. Ming-Jiunn discloses in figure 7 then forming a whole pad electrode for wire bonding on a center of the upper surface of the window layer conductive with the window layer. Ming-Jiunn does not teach that the surface ohmic electrode is composed of a plurality of electrodes. Okazaki teaches in figures 1 and 4 a surface ohmic electrode (13) composed of a plurality of electrodes, and the window layer covers the surface of the group III

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nitride crystal layer below the pad electrode. It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the plurality of electrodes of Okazaki in the device of Ming-Jiunn in order to effectively scatter current as stated by Okazaki in column 6, lines 6 – 9. As far as the examiner can ascertain Ming-Jiunn and Okazaki read on the limitation that the second conduction type surface ohmic electrode does not exist below the pad electrode.

With regard to claim 20, Ming-Jiunn discloses in figure 7 wherein the pad electrode is formed on the group-III nitride crystal layer through a window layer comprising an electrically conductive transparent oxide crystal layer so that the electrically conducting transparent oxide crystal layer is not present on the surface of the pad electrode used for wire bonding.

8. Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ming-Jiunn and Okazaki as applied to claim 11 above, and further in view of Bastek (USPAT 4232440).

It is not clear if Ming-Jiunn and Okazaki teach wherein the surface ohmic electrodes are disposed at isometric positions from the center of the pad electrode. Bastek teaches in figure 3 wherein surface ohmic electrodes (16) are disposed at isometric positions from the center of a pad electrode (15). It would have been obvious to one of ordinary skill in the art at the time of the present invention to use the positioning of Bastek in the device of Ming-Jiunn and Okazaki in order to make contact to a light emitting portion of a light emitting device with a high degree of reliability and with minimum interference with light emission.

Response to Arguments

9. Applicant's arguments filed April 18, 2003 have been fully considered but they are not persuasive.

10. With regard to the applicant's argument that "Namely, in reference to Fig. 3, 'accordingly in a second embodiment of the present invention, the surface of ohmic electrodes 308 are disposed on the surface of the region 307(b) (hereinafter referred to as an 'open light emitting region 307b' other than the projective region 307a of the pad electrode 307 on the group – III nitride crystal layer constituting the stack layer structure 31),'" it is not clear how this quotation, or figures 3, 4, and 6 provide support for the claim limitation "said second conduction-type surface ohmic electrode ... does not exist below said pad electrode." Figure 3 and the description thereof clearly describe the ohmic electrodes 308 as being in a relative position below the pad electrode 307. In other words, with direct reference to figure 3, pad electrodes 307 are above ohmic electrodes 308. Even though the ohmic electrodes are in area 307b, to the outside periphery of area 307a, they are still below the pad electrode. No attempt has been made to describe areas 307a and 307b in the claimed invention. Therefore, the applicant's arguments are not persuasive, and the rejection is proper.

11. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on

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combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Takeuchi et al. discloses a Group-III semiconductor device with a conduction-type surface electrode comprising a plurality of electrodes.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul E Brock II whose telephone number is (703)308-6236. The examiner can normally be reached on 8:30 AM-5:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on (703)308-1690. The fax phone numbers for the organization where this application or proceeding is assigned are (703)308-7722 for regular communications and (703)308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703)308-0956.

Paul E Brock II
June 11, 2003



EDDIE LEE
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800